IN THE DRAWINGS:

Applicant submits herewith nine substitute drawing sheets, FIGS. 1A-10.

Remarks

Claims 1-165 are pending in this application. Claims 1-6, 13-18, 25-30, 37-42, 49-54, 61-151, 158, 159, 162, 163, and 165 stand rejected. Claims 7-12, 19-24, 31-36, 43-48, 55-60, 152-167, 160, 161, and 164 stand objected to. Applicant has cancelled claims 13-24, 37-48, 61-72, 85-96, 109-120, and 133-144. Applicant has amended claims 1, 4-12, 25, 28-36, 49, 52-60, 73, 76-84, 97, 100-108, 121, 124-132, 145, 146, and 149-158.

In the Title

Applicant has amended the title of the application in order for it to be more particularly indicative of the invention to which the claims are directed. As amended, the title is "Methods and Apparatus for Bandwidth Measurement and Bandwidth Parameter Calculation for Laser Light."

In the Abstract

The abstract of the disclosure stands objected to because the abstract must be limited to a range of 50 to 150 words. Applicant has amended the abstract such that it has between 50 and 150 words.

In the Drawings

The drawings stand objected to because figures 1-3 must be labeled as prior art. Applicant submits herewith nine substitute drawing sheets, FIGS. 1A-10, which label FIGS. 1-3 as prior art, and amends FIG. 8A to note "FW25%".

The 35 U.S.C. § 112 Rejections

Claims 61-144 stand rejected under 35 U.S.C. § 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter of the invention.

As indicated above, Applicant has cancelled claims 61-72, 85-96,109-120, and 133-144. Applicant has amended independent claims 73, 97, and 121 in order to more particularly point out the claimed invention.

As amended, claim 73 relates to a bandwidth meter for measuring the bandwidth of a spectrum of light emitted from a laser input to the bandwidth meter. The bandwidth meter has an optical dispersive means configured to disperse energy in the light emitted from the laser, the dispersion converting the emitted light from a wavelength domain into a spatial domain or temporal domain based on the wavelength distribution of the light energy from the laser. The bandwidth meter further comprises a detector means configured to record a spatial variation or a temporal variation of the wavelength distribution of the light energy, the detector further configured to provide an output signal based on the recorded spatial variation or temporal variation, wherein the output signal comprises a first spectrum width and a second spectrum width. The bandwidth meter further comprises a bandwidth calculation means, configured to calculate an actual bandwidth parameter utilizing the first spectrum width and the second spectrum width as part of a multivariable equation employing predetermined calibration variables specific to the optical dispersive means.

Applicant submits that amended claim 73 particularly points out and distinctly claims the invention, and is in condition for allowance. Applicant submits that Claims 74-84, which depend from claim 73, are also in condition for allowance. Applicant has amended claims 76-84 so as to conform with amended claim 73. Applicant submits that claims 73-84 clearly set forth the metes and bounds of patent protection.

As amended, claim 97 relates to a photolithography light source comprising a bandwidth meter means for measuring the bandwidth of a spectrum of light emitted from a laser input to the bandwidth meter means. The bandwidth meter means comprises an optical dispersive instrument means configured to disperse energy in the light emitted from the laser, the dispersion converting the emitted light from a wavelength domain into a spatial domain or temporal domain based on the wavelength distribution of the light energy from the laser. The bandwidth meter means further comprises a detector means configured to record a spatial variation or a temporal variation of the wavelength distribution of the light energy, the detector further configured to provide an output signal

based on the recorded spatial variation or temporal variation, wherein the output signal comprises a first spectrum width and a second spectrum width. The bandwidth meter means further comprises a bandwidth calculation means configured to calculate an actual bandwidth parameter utilizing the first spectrum width and the second spectrum width as part of a multivariable equation employing predetermined calibration variables specific to the optical dispersive instrument means.

Applicant submits that amended claim 97 particularly points out and distinctly claims the invention, and is in condition for allowance. Applicant submits that Claims 98-108, which depend from claim 97, are also in condition for allowance. Applicant has amended claims 100-108 so as to conform with amended claim 97. Applicant submits that claims 97-108 clearly set forth the metes and bounds of patent protection.

As amended, claim 121 relates to a photolithography tool comprising a laser light source. The laser light source comprises a bandwidth meter means for measuring the bandwidth of a spectrum of light emitted from a laser input to the bandwidth meter means. The bandwidth meter means comprises an optical dispersive instrument means configured to disperse energy in the light emitted from the laser, the dispersion converting the emitted light from a wavelength domain into a spatial domain or temporal domain based on the wavelength distribution of the light energy from the laser. The bandwidth meter means further comprises detector means configured to record a spatial variation or a temporal variation of the wavelength distribution of the light energy, the detector further configured to provide an output signal based on the recorded spatial variation or temporal variation, wherein the output signal comprises a first spectrum width and a second spectrum width. The bandwidth meter means further comprises a bandwidth calculation means configured to calculate an actual bandwidth parameter utilizing the first spectrum width and the second spectrum width as part of a multivariable equation employing predetermined calibration variables specific to the optical dispersive instrument means.

Applicant submits that amended claim 121 particularly points out and distinctly claims the invention, and is in condition for allowance. Applicant submits that Claims 122-132, which depend from claim 121, are also in condition for allowance. Applicant

has amended claims 124-132 so as to conform with amended claim 121. Applicant submits that claims 121-132 clearly set forth the metes and bounds of patent protection.

Accordingly, Applicant contends that claims 73, 97, and 121 are in condition for allowance. Claims 74-84, 98-108, and 122-132, and 134-144 which depend from claims 73, 97, and 121 are also in condition for allowance.

The 35 U.S.C. § 101 Rejections

Claim 145 stands rejected under 35 U.S.C. § 101 because the claimed invention is directed to non-statutory subject matter. Specifically, the Examiner contends that merely computing is insufficient to constitute a tangible result.

Applicant has amended claim 145 in order to more particularly point out the claimed invention. As amended, claim 145 relates to a method for measuring the bandwidth of a spectrum of light emitted from a laser input to the bandwidth meter. The method comprises utilizing an optical dispersive instrument configured to disperse energy in the light emitted from the laser, converting the emitted light from a wavelength domain into a spatial domain or temporal domain based on the wavelength distribution of the light energy from the laser. The method further comprises recording a spatial variation or a temporal variation of the wavelength distribution of the light energy. The method further comprises providing an output signal based on the recorded spatial variation or temporal variation, wherein the output signal comprises a first spectrum width and a second spectrum width. The method further comprises calculating an actual bandwidth parameter utilizing the first spectrum width and the second spectrum width as part of a multivariable linear equation employing predetermined calibration variables.

Applicant urges that claim 145 recites more than merely computing and, therefore, does constitute statutory subject matter. The method of claim 145 includes several different steps, only one of which is a step involving computing. The first step utilizes an optical dispersive instrument configured to disperse energy in the light emitted from the laser, and converts the emitted light from a wavelength domain into a spatial domain or temporal domain based on the wavelength distribution of the light energy from the laser. Thus, at least in this step, the method involves concrete interaction with a physical, real-world phenomenon such as the light emitted from a laser. Next, the

method relates to recording a spatial variation or a temporal variation of the wavelength distribution of the light energy. The method further provides an output signal based on the recorded spatial variation or temporal variation, wherein the output signal comprises a first spectrum width and a second spectrum width. The last step involves calculating an actual bandwidth parameter utilizing the first spectrum width and the second spectrum width as part of a multivariable linear equation employing predetermined calibration variables. In other words, according to the claim, the spectrum of emitted laser light is first measured and then based on that step a bandwidth parameter of the spectrum is provided, or output. Admittedly, the claim does not expressly recite what the bandwidth parameter is provided to but Applicant urges that such an express recitation is not necessary under 35 U.S.C. § 101. Thus, Applicant urges that the method of claim 145 does constitute statutory subject matter because this claim recites a method that includes measuring a parameter of a physical phenomenon in a particular way and then providing a bandwidth parameter as a result in a method for measuring the bandwidth of a spectrum of light. In view of the above remarks, Applicant urges reconsideration and withdrawal of the rejection under 35 U.S.C. § 101.

The 35 U.S.C. 102(b) Rejections

Claims 1-3, 13-15, 25-27, 37-39, 49-51, 61-63, 73-75, 85-87, 97-99, 109-11, 121-123, 133-135, 145-148, 158-159, 162, 163, and 165 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,317,448 to Das et al (hereinafter, *Das*). As noted above, Applicant has amended claims 1, 25, 49, 73, 97, 121, 145, 146, and 158.

As amended, claim 1 relates to a bandwidth meter for measuring the bandwidth of a spectrum of light emitted from a laser input to the bandwidth meter. The bandwidth meter comprises an optical dispersive instrument configured to disperse energy in the light emitted from the laser, the dispersion converting the emitted light from a wavelength domain into a spatial domain or temporal domain based on the wavelength distribution of the light energy from the laser. The bandwidth meter further comprises a detector configured to record a spatial variation or a temporal variation of the wavelength distribution of the light energy, the detector further configured to provide an output signal based on the recorded spatial variation or temporal variation, wherein the output signal

comprises a first spectrum width and a second spectrum width. The bandwidth meter further comprises a bandwidth calculation apparatus configured to calculate an actual bandwidth parameter utilizing the first spectrum width and the second spectrum width as part of a multivariable equation employing predetermined calibration variables specific to the optical dispersive instrument.

Das relates to bandwidth estimation, where the bandwidth of a laser is computed. As shown in FIG. 9B and described in col. 6, lines 39-63, the *inner and outer fringe diameters* D_1 and D_2 of a wave are each converted into *wavelengths* λ_1 and λ_2, where the bandwidth of the laser is computed as $(\lambda_2 - \lambda_1)/2$. To determine the true laser bandwidth, a fixed correction factor ($\Delta \lambda \varepsilon$) is subtracted to account for the intrinsic width of the etalon peak adding to the true laser bandwidth. Thus, *Das* calculates the true laser bandwidth as $((D_2 - D_1)/2) - \Delta \lambda \varepsilon$, where D_1 and D_2 are *wavelengths*.

The bandwidth meter of Applicant's system improves upon *Das* by using an optical dispersive instrument to disperse energy in the light emitted from the laser, where the dispersion converts the emitted light from a wavelength domain into a spatial domain or temporal domain based on the wavelength distribution of the light energy from the laser. A detector records the spatial or temporal variation, and provides an output signal that indicates a first spectrum width and a second spectrum width. A bandwidth calculation apparatus is configured to calculate an actual bandwidth parameter utilizing the first *spectrum width* and the *second spectrum* width as part of a multivariable equation. For example, the output signal may be representative of spectrum width between two points on the spectrum defining a content of the spectrum enclosing some percentage of the energy of the full spectrum of the spectrum of light emitted from the light source. See, e.g., Applicant's specification at page 24, lines 2-8. For example, if two spectrum widths such as FW35% and FW75% are used, the bandwidth calculation apparatus may be configured to calculate the bandwidth with the multivariable equation

$$E_{source} \approx K \cdot w(35\%, \gamma) + L \cdot w(75\%, \gamma) + M,$$

where K, L, M are calibration constants determined by the best fit of the optical dispersive element. See, e.g., Applicant's specification at page 21, lines 13-19. Applicant therefore contends that the claimed invention improves upon *Das* by utilizing *spectrum widths, not wavelengths,* in a multivariable equation to determine bandwidth of

a spectrum of light emitted from a laser. Accordingly, Applicant submits that Claim 1 is in condition for allowance. Furthermore, Applicant submits that claims 4-12, 25, 28-36, 49, 52-60, 73, 76-84, 97, 100-108, 121, 124-132, 145, 146, and 149-158 are allowable for at least the same reasons that claim 1 is allowable.

The Double Patenting Rejections

Claims 1-6, 13-18, 25-30, 37-42, 49-54, 61-66, 73-78, 85-90, 97-107, 109-114, 121-126, 133-138, and 146-151 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-6 and 37-42 of U.S. Patent 6,952,267.

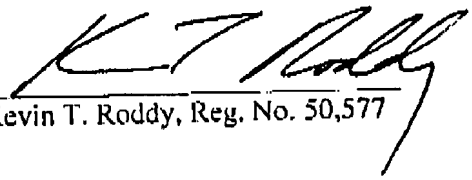
In order to advance prosecution of this case in a timely and efficient manner, Applicant has provided with this Response an appropriate Terminal Disclaimer to overcome this rejection. However, Applicant does not intend for such actions to be construed as necessarily acquiescing to the accuracy or appropriateness of this rejection.

Conclusion

For at least the above reasons, Applicant submits that claims 1-12, 15-36, 49-60, 73-84, 97-108, 121-132, and 145-165.

Applicant authorizes the Commissioner to charge our Deposit Account No. 03-4060 in the total amount of $1150.00 which includes the $1020.00 for the three-month extension of time fee and $130.00 for the terminal disclaimer fee. Applicant does not believe any other fees are due, however if any fees are due, the Commissioner is hereby authorized to charge or credit the Deposit Account of Cymer, Inc., Deposit Account 03-4060 for any such fees.

Respectfully submitted,



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